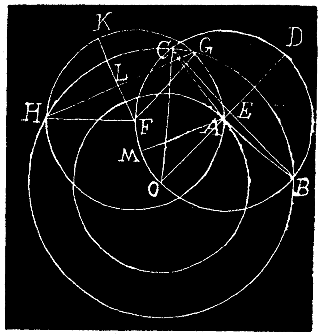
$$P_2=\frac{1}{\pi^2}\int_0^{2\sin^{-1}\frac{3}{4}}(\pi-\phi_1)d\theta.$$

This is not integrable in general terms but its value may be readily approximated by methods of mechanical quadrature.

II. Solution by G. B. M. ZERR. A. M., Ph. D., President and Professor of Mathematics in Russell College, Lebanon, Va., and J. A. MOORE. Ph. D.. Professor of Mathematics, Millsaps College. Jackson, Miss.

Let $AO=a$, then $CO=\frac{3}{2}a$.

(1). Let his first step place him at the point A, then in order that he may step outside on the second step he must step somewhere on the arc CDB.



Let $AE=t$, $EC=u$, $\angle DAC=\beta$, P=chance in (1), p=chance in (2).

Now $u^2=a^2-t^2=\frac{9}{4}a^2-(a+t)^2$, $\therefore$ $t=\frac{1}{8}a$.

$\therefore$ $\cos\beta=\frac{1}{8}$.

$\therefore$ $P=\beta/\pi=\cos^{-1}\frac{1}{8}/\pi=.460106$.

(2). Let chord $OM=\frac{1}{2}a$, then in order that he may step out the third step he must step somewhere on the arc CM or its equal on the opposite side

$$\angle CAM=\delta=\pi-(\beta+OAM)$$
$$=\cos^{-1}\left(\frac{3\sqrt{105}-7}{64}\right).$$

P_1=chance he steps on this arc$=\delta/\pi=.379034$.

If his second step places him on arc CM then his third step must place him on the arc GKH. The $\angle KFH$ may vary from 0 to $\cos^{-1}(-\frac{1}{3})$.

$\therefore$ p_1=chance that he steps on arc $GKH=\dfrac{\cos^{-1}(-\frac{1}{3})}{2\pi}$.

$\therefore$ $p_1=.304086$.

Now $p=P_1\times p_1=\delta/\pi\times\dfrac{\cos^{-1}(-\frac{1}{3})}{2\pi}=.115259$.

Solved with a different result by *CHAS. C. CROSS*.

55. Proposed by G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics in Russell College, Lebanon, Va.

It has been clear for 15 consecutive days, what is the chance of the 16th day being cloudy ?

Solution by the PROPOSER.

Let p=chance, p_1=chance that 16th day is clear.

$$\therefore\ p_1=\frac{\int_0^1 x^{16}dx}{\int_0^1 x^{15}dx}=\tfrac{16}{17}.\quad \therefore\ p=1-p_1=\tfrac{1}{17}.$$